

What is claimed is:

1. A resilient packet ring (RPR) network system  
in a RPR network where a plurality of station nodes  
5 terminating media access control (MAC) frames and a  
plurality of bridge nodes forwarding MAC frames are  
connected to one or more ringlets,

wherein each of the station nodes, in the case  
of transmitting a MAC frame to other station node,  
10 transmits a RPR MAC frame in which a MAC address of  
the other station node is set as a destination MAC  
address, and transmits, in the case of transmitting a  
MAC frame to a station accommodated to a bridge node  
and located in the outside of the ringlets, a RPR MAC  
15 frame into which the MAC frame is encapsulated in  
such a state that the node can capture the MAC frame,

each of the bridge nodes, in the case of  
receiving, from a station accommodated to the bridge  
node itself and located in the outside of the  
20 ringlets, the MAC frame in which a MAC address of a  
station accommodated to other bridge node and located  
in the outside of the ringlets is set as a  
destination address, transmits a RPR MAC frame into  
which the MAC frame is encapsulated in such a state  
25 that the other bridge node can capture the RPR MAC  
frame, and, in the case of receiving, from a station  
accommodated to the bridge node itself, a MAC frame

in which a MAC address of a station node is set as a destination MAC address, converts the MAC frame into a RPR MAC frame and transmits the RPR MAC frame,

each of the station nodes captures the RPR MAC  
5 frame that the MAC frame is not encapsulated, and

each of the bridge nodes captures the RPR MAC frame into which the MAC frame is encapsulated, and transmits the MAC frame within the captured RPR MAC frame to a station accommodated to the bridge node  
10 itself and located in the outside of the ringlets.

2. A RPR network system according to claim 1, wherein each of the station nodes and each of the bridge nodes have a table registered with the MAC  
15 addresses of all the station nodes and bridge nodes connected to the ringlets,

each of the station nodes, in the case of transmitting a MAC frame, converts the MAC frame into a RPR MAC format and transmits the RPR MAC frame if a  
20 destination MAC address of the MAC frame is registered in the table, and transmits a RPR MAC frame into which the MAC frame is encapsulated if the destination MAC address is not registered in the table, and

25 each of the bridge nodes, in the case of forwarding a MAC frame received from a station accommodated to the bridge node itself and located in

the outside of the ringlets, transmits the MAC frame converted into a RPR MAC frame format if a destination MAC address of the MAC frame is registered in the table, and transmits a RPR MAC frame into which the MAC frame is encapsulated if the destination MAC address is not registered in the table.

3. A RPR network system according to claim 2, wherein each of the station nodes and each of the bridge nodes have a mapping table stored with correspondence between a MAC address of each bridge node and a MAC address of a station accommodated to each bridge node and located in the outside of the ringlets, and

each of the station nodes and each of the bridge nodes, in the case of transmitting a RPR MAC frame into which a MAC frame is encapsulated, if a MAC address of a bridge node corresponding to a destination MAC address of the MAC frame is stored in the mapping table, set the MAC address of the bridge node for a destination MAC address of the RPR MAC frame.

4. A RPR network system according to claim 3, wherein each of the station nodes and each of the bridge nodes retain a multicast address that all the

bridge nodes belong to a group of the multicast address, and

each of the station nodes and each of the bridge nodes, in the case of transmitting a RPR MAC  
5 frame into which a MAC frame is encapsulated, if a MAC address of a bridge node corresponding to a destination MAC address of the MAC frame is not stored in the mapping table, set the multicast address for a destination MAC address of the RPR MAC  
10 frame.

5. A RPR network system according to claim 3, wherein each of the bridge nodes, in the case of transmitting a RPR MAC frame into which a MAC frame  
15 is encapsulated and in which a MAC address of a bridge node corresponding to a destination MAC address of the MAC frame is set for a destination MAC address of thereof, sets a MAC address of the bridge node itself for a source MAC address of the RPR MAC  
20 frame, and

the station node and/or the bridge node and forwarding the RPR MAC frame into which the MAC frame transmitted from the bridge node is encapsulated, stores the mapping table with correspondence between  
25 a source MAC address of the RPR MAC frame and a source MAC address of the MAC frame within the RPR MAC frame.

6. A bridge node connected, together with a plurality of station nodes terminating media access control (MAC) frames, to one or more ringlets  
5 constructing a resilient packet ring (RPR) network,  
wherein the bridge node, in the case of receiving the MAC frame transmitted from a station being located in the outside of the ringlets and in which a MAC address of other station located in the  
10 outside of the ringlets and accommodated to other bridge node connected to the ringlets is set for a destination MAC address, transmits a RPR MAC frame into which the MAC frame is encapsulated in such a state that the other bridge node can capture the RPR  
15 MAC frame, and  
the bridge node, in the case of receiving a MAC frame in which a MAC address of a station node is set for a destination MAC address from the station, converts the MAC frame into a RPR MAC frame and  
20 transmits the RPR MAC frame.

7. A bridge node according to claim 6, wherein the bridge node has a table registered with MAC addresses of all the station nodes and bridge nodes  
25 connected to the ringlets, and

the bridge node, in the case of forwarding a MAC frame received from the station, converts the MAC

frame into a RPR MAC frame and transmits the RPR MAC  
frame if a destination MAC address of the MAC frame  
is registered in the table, and transmits a RPR MAC  
frame into which the MAC frame is encapsulated if the  
5 destination MAC address of the MAC frame is not  
registered in the table.

8. A bridge node according to claim 7, wherein  
the bridge node further has a mapping table stored  
10 with correspondence between the MAC addresses of the  
bridge nodes and a MAC address of a station located  
in the outside of the ringlets and accommodated to  
the bridge nodes, and

the bridge node, in the case of transmitting a  
15 RPR MAC frame into which a MAC frame is encapsulated,  
if a MAC address of a bridge node corresponding to a  
destination MAC address of the MAC frame is stored in  
the mapping table, sets the MAC address of the bridge  
node for a destination MAC address of the RPR MAC  
20 frame.

9. A bridge node according to claim 8, wherein  
the bridge node retains a multicast address that all  
the plurality of bridge nodes belong to a group of  
25 the multicast address, and

the bridge node, in the case of transmitting a  
RPR MAC frame into which a MAC frame is encapsulated,

if a MAC address of a bridge node corresponding to a destination MAC address of the MAC frame is not stored in the mapping table, sets the multicast address for a destination MAC address of the RPR MAC  
5 frame.

10. A bridge node according to claim 8, wherein the bridge node, in the case of forwarding a RPR MAC frame transmitted from other bridge node, wherein the  
10 RPR MAC frame has a encapsulated MAC frame, has a MAC address of a bridge node corresponding to a destination MAC address of the encapsulated MAC frame as a destination MAC address thereof, and has a MAC address of other bridge node as a source MAC address  
15 thereof, stores the mapping table with correspondence between the source MAC address of the RPR MAC frame and the source MAC address of the encapsulated MAC frame.

20 11. A station node connected, together with a plurality of bridge nodes forwarding a media access control (MAC) frame, to one or more ringlets constructing a resilient packet ring (RPR) network,

Wherein the station node, in the case of  
25 transmitting a MAC frame transmitted to other station node connected to the ringlets, transmits a RPR MAC frame in which a MAC address of the other station

node is set for a destination MAC address, and

the station node, in the case of transmitting a  
MAC frame to a station accommodated to a bridge node  
and located in the outside of the ringlets, transmits  
5 a RPR MAC frame into which the MAC frame is  
encapsulated in such a state that the bridge node can  
capture the RPR MAC frame.

12. A station node according to claim 11,  
10 wherein the station node has a table registered with  
MAC addresses of all the station nodes and bridge  
nodes connected to the ringlets, and

the station node, in the case of transmitting a  
MAC frame, converts the MAC frame into a RPR MAC  
15 frame and transmits the RPR MAC frame if a  
destination MAC address of the MAC frame is  
registered in the table, and transmits a RPR MAC  
frame into which the MAC frame is encapsulated if the  
destination MAC address of the MAC frame is not  
20 registered in the table.

13. A station node according to claim 12,  
wherein the station node further has a mapping table  
stored with correspondence between a MAC address of  
25 each bridge node and a MAC address of a station  
accommodated to each bridge node and located in the  
outside of the ringlets, and



the station node, in the case of transmitting a RPR MAC frame into which a MAC frame is encapsulated, if a MAC address of a bridge node corresponding to a destination MAC address of the MAC frame is stored in the mapping table, sets the MAC address of the bridge node for a destination MAC address of the RPR MAC frame.

14. A station node according to claim 13,  
10 wherein the station node retains a multicast address that all the bridge nodes belong to a group of the multicast address, and

the station node, in the case of transmitting a RPR MAC frame into which a MAC frame is encapsulated,  
15 if a MAC address of a bridge node corresponding to a destination MAC address of the MAC frame, sets the multicast address for a destination MAC address of the RPR MAC frame.

20 15. A station node according to claim 13,  
wherein the station node, in the case of forwarding a RPR MAC frame transmitted from other bridge node,  
wherein the RPR MAC frame has a encapsulated MAC frame, has a MAC address of a bridge node  
25 corresponding to a destination MAC address of the MAC frame as a destination MAC address thereof, and has a MAC address of other bridge node as a source MAC

address thereof, stores the mapping table with  
correspondence between the source MAC address of the  
RPR MAC frame and the source MAC address of the  
encapsulated MAC frame within the RPR MAC frame.

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16. A resilient packet ring (RPR) card  
installed into a bridge node connected, together with  
a plurality of station nodes terminating a media  
access control (MAC) frame, to one or more ringlets  
10 constructing a RPR network,

wherein the RPR card, in the case of receiving  
a MAC frame transmitted from a station located in the  
outside of the ringlets, wherein the MAC frame has a  
MAC address of other station located in the outside  
15 of the ringlets and accommodated to other bridge node  
on the ringlets as a destination MAC address thereof,  
transmits a RPR MAC frame into which the MAC frame is  
encapsulated in such a state that the other bridge  
node can capture the RPR MAC frame, and

20 the RPR card, in the case of receiving a MAC  
frame in which a MAC address of a station node is set  
in a destination MAC address from the station,  
converts the MAC frame into a RPR MAC frame and  
transmits the RPR MAC frame.

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17. A RPR card according to claim 16, wherein  
the RPR card has a table registered with

correspondence between MAC addresses of all the station nodes and bridge nodes connected to the ringlets, and

the RPR card, in the case of forwarding a MAC  
5 frame received from the station, converts the MAC  
frame into a RPR MAC frame and transmits the RPR MAC  
frame if a destination MAC address of the MAC frame  
is registered in the table, and transmits a RPR MAC  
frame into which the MAC frame is encapsulated if the  
10 destination MAC address of the MAC frame is not  
registered in the table.

18. A RPR card according to claim 17, wherein  
the RPR card further has a mapping table stored with  
15 correspondence between a MAC address of each bridge  
node and a MAC address of a station located in the  
outside of the ringlets and accommodated to each  
bridge node, and

the RPR card, in the case of transmitting a RPR  
20 MAC frame into which a MAC frame is encapsulated, if  
a MAC address of a bridge node corresponding to a  
destination MAC address of the MAC frame is stored in  
the mapping table, sets the MAC address of the bridge  
node for a destination MAC address of the RPR MAC  
25 frame.

19. A RPR card according to claim 18, wherein

the RPR card retains a multicast address that all the bridge nodes on the ringlets belong to a group of the multicast address, and

the RPR card, in the case of transmitting a RPR  
5 MAC frame into which a MAC frame is encapsulated, if  
a MAC address of a bridge node corresponding to a  
destination MAC address of the MAC frame is not  
stored in the mapping table, sets the multicast  
address for a destination MAC address of the RPR MAC  
10 frame.

20. A RPR card according to claim 18, wherein  
the RPR card, in the case of forwarding a RPR MAC  
frame transmitted from other bridge node, wherein the  
15 RPR MAC frame has a encapsulated MAC frame therein,  
has a MAC address of a bridge node corresponding to a  
destination MAC address of the MAC frame as a  
destination MAC address thereof, and has a MAC  
address of the other bridge node as a source MAC  
20 address thereof, stores the mapping table with  
correspondence between the source MAC address of the  
RPR MAC frame and a source MAC address of the  
encapsulated MAC frame within the RPR MAC frame.

25 21. A media access control (MAC) frame  
forwarding method for a bridge node connected,  
together with a plurality of station nodes

terminating MAC frames, to one or more ringlets  
constructing a resilient packet ring (RPR) network,  
said method comprising:

transmitting, in the case of receiving a MAC  
5 frame from a station, which is located in the outside  
of the ringlets, and in which a MAC address of other  
station, which is located in the outside of the  
ringlets and is accommodated to other bridge node  
connected to the ringlets, is set for a destination  
10 MAC address, a RPR MAC frame into which the MAC frame  
is encapsulated in such a state that the other bridge  
node can capture the RPR MAC frame; and

converting, in the case of receiving a MAC  
frame from the station in which a MAC address of a  
15 station node is set for a destination MAC address,  
the MAC frame into a RPR MAC frame and transmitting  
the RPR MAC frame.

22. A MAC frame forwarding method for a  
20 resilient packet ring (RPR) card installed into a  
bridge node connected, together with a plurality of  
station nodes terminating media access control (MAC)  
frames, to one or more ringlets constructing a RPR  
network, said method comprising:

25 transmitting, in the case of receiving a MAC  
frame from a station, which is located in the outside  
of the ringlets, and in which a MAC address of other

station, which is located in the outside of the  
ringlets and is accommodated to other bridge node  
connected to the ringlets, is set for a destination  
MAC address thereof, a RPR MAC frame into which the  
5 MAC frame is encapsulated in such a state that the  
other bridge node can capture the RPR MAC frame, and  
converting, in the case of receiving a MAC  
frame from the station in which a MAC address of a  
station node is set for a destination MAC address,  
10 the MAC frame into a RPR MAC frame and transmitting  
the RPR MAC frame.